Directorate of Intelligence

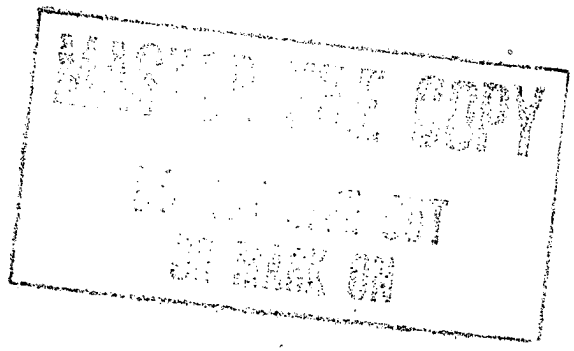
Confidential

25X1

Soviet Agriculture in the 1980s

25X1

A Research Paper



Confidential

SOV 84-10154
September 1984

Copy 451

25X1

Soviet Agriculture in the 1980s

25X1

A Research Paper

This paper was prepared by
Office of Soviet Analysis, with contributions from
SOVA. Comments and queries
are welcome and may be directed to the Chief, Soviet
Economy Division, SOVA,

25X1

25X1

25X1

Confidential
SOV 84-10154
September 1984

25X1

Soviet Agriculture in the 1980s

25X1

Key Judgments

Information available as of 1 June 1984 was used in this report.

As the new Soviet regime surveys the USSR's food production prospects for the balance of the 1980s, the legacy of poor performance and increasing resource burden of the late 1970s and early 1980s must weigh heavily in policy discussions and resource allocation planning. Speeches by Soviet leaders indicate their awareness that the slowing growth in farm output since 1975 is not entirely due to less favorable weather. They know that agriculturally related activity is beset by inefficiency and annually requires about one-third of total investment, one-fourth of hard currency earnings, and growing subsidies to maintain stable retail food prices. Although Moscow plans to change its approach to food production, we see little chance of its avoiding a continued rise in the resource burden in the next few years.

25X1

General Secretary Chernenko, and Andropov before him, have supported Brezhnev's Food Program for the 1980s. The program reorganizes food production, revises incentives, reorders investment priorities, and promises more industrial goods to enterprises and organizations involved in food production. The Soviets are also improving feed rations for livestock, increasing use of summer fallow, and improving crop varieties and animal breeds to raise the quantity and quality of farm output. Using this blueprint for increasing domestic food production, the leadership hopes to simultaneously provide a steady improvement in diet for the Soviet consumer and reduce the USSR's dependence on imports of Western grain and other foodstuffs.

25X1

Development of the Soviet farm sector in the 1980s will depend strongly on weather trends and how the leadership implements the Food Program. Our three illustrative farm output scenarios incorporate different assumptions about weather, support from industry, and implementation of the Food Program. Our baseline projection of average annual growth in net farm output of 2.0 to 2.5 percent in the 1980s assumes weather conditions approximating the 1960-83 average and some implementation of proposed changes. Production growth could be as low as 0 to 0.5 percent per year if support from industry during 1976-80 and the much less favorable weather experienced after 1978 are repeated. At best, with above-average weather and more-than-likely success in implementing the Food Program, production growth might average 2.5 to 3.0 percent per year in the 1980s.

25X1

25X1

The per capita consumption gains provided by our baseline projection of growth in farm output probably would be considered adequate by the regime, especially if Chernenko adopts Andropov's view that major improvements in consumption are not an urgent necessity. Massive imports of grain and other food products from the West probably would not occur in years of average weather as long as the regime maintains what we consider to be its present belief that minimizing dependence on food imports from the West is more important than rapid growth in per capita food consumption. If, however, the priority of improving the diet rises, the leadership probably would be willing to increase imports of grain from the West as well as meat and vegetables from other Communist countries to the extent that the latter countries could supply them.

25X1

Regardless of which of the three farm output scenarios is close to the mark, Soviet agriculture will continue to experience difficulty in realizing potential benefits from planned improvements in management and new technologies. New programs do not substantially improve incentives for farms to carry out agricultural operations on a timely, efficient basis. Lack of these incentives probably will continue to be the most important cause of low product quality and high levels of waste in harvesting, transportation, storage, and processing of farm products. Moreover, a number of factors, individually troublesome, combine to sap the productivity of the farm sector's increasing stock of plant and equipment.

25X1

First, farm production will be plagued by high costs and low productivity until the leadership:

- Eliminates centrally determined quotas for output of farm products and for goods and services used in production.
- Stops interference by party officials and bureaucrats in day-to-day farm operations.
- Sufficiently overhauls the inappropriate price structure, both for goods and services sold to farms and for farm products.
- Replaces gross farm production as the most important determinant of success with an indicator that takes into account product quality and production cost.

25X1

Second, unless planners give the Food Program very high and continuing priority, the slow pace of industrial growth that we project for the 1980s will hold down growth in industrial support to producers of farm machinery, to farms, and to food-processing enterprises. Although Soviet trade officials have recently expressed interest in a wide range of Western equipment and technology for food production, such imports—if they occur—are likely to play only a minor role in food production in the 1980s. Many of the general problems the Soviets face with assimilation of foreign technology would be especially severe for the widely dispersed farm sector.

25X1

25X1

Third, because of inadequate incentives and poor support from industry, technical progress in food production will occur slowly. Thus, it will be difficult to substantially improve returns to new investment and to other important inputs, such as livestock feed and fertilizer, in the 1980s. 25X1

Finally, shortages of younger, skilled workers will persist in many regions until there are major improvements in rural living conditions and there is an upturn in annual increments to the general labor force. 25X1

If the weather is poor or if Soviet leaders decide that under current resource programs and decisionmaking arrangements the cost of likely gains is too high, additional changes in the management of food production might be considered. We do not believe, however, that in the 1980s Soviet leaders will move very far toward decentralizing management of agriculture as was done in Hungary and China. In these countries:

- Centrally determined procurement plans have been reduced or abolished.
- Farm managers and private producers appropriately make production decisions.
- The government controls the mix of farm products indirectly by manipulating procurement prices. 25X1

In debating the advantages of less centralized management, Soviet writers have noted undesirable side effects of the Chinese reforms, such as rural inflation, and often have rejected Hungarian and other East European experiments on the justifiable notion that solutions appropriate for the small countries of Eastern Europe are not suitable for a country the size of the USSR. 25X1

More important, however, Soviet leaders have a firm belief in their own system. Movement toward market-oriented systems appears to be unacceptable on ideological grounds. The leadership perhaps considers raising efficiency and lowering costs less important than avoiding the political risks of weakening central control over economic activity in the important farm sector. Furthermore, Soviet officials for the most part do not share the confidence of Chinese and Hungarian leaders in the ability of local farm managers and private producers to make the "correct" production decisions. For example, local Soviet party officials continue to interfere in day-to-day farm operations despite the fact that Khrushchev, Brezhnev, Andropov, and current agriculture secretary Mikhail Gorbachev all have condemned this practice, recognizing that it reduces farm efficiency

25X1

Contents

25X1

Preface

This report assesses the impact of economic factors on Soviet agricultural production through 1990. It focuses on the allocation and use of resources as these reflect current policies for managing the food production process. Changes in the internal political situation that may affect agriculture will be analyzed in a more general report on resource-allocation policy in the USSR, to appear in the next few months.

25X1

25X1

Soviet Agriculture in the 1980s

25X1

Introduction

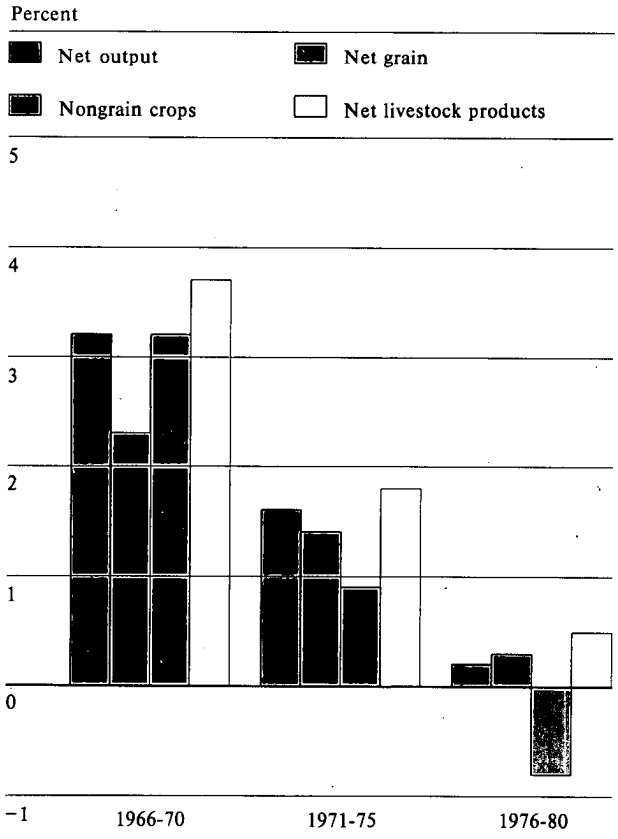
The Soviet farm sector absorbs about 20 percent of the labor force and 20 percent of the USSR's stock of fixed capital (excluding housing and services), but it has been unable to provide the population with a diet comparable to that in other industrialized countries in terms of quality and nutritional balance. Thus, during the 1970s, the regime relied heavily on imports of foreign agricultural products just to maintain previous levels of food consumption. In the 1980s, Soviet policymakers are committed to steady dietary improvement with fewer food imports, especially from the West. To achieve this goal, the regime must devise a strategy that will promote (1) more rapid growth in output of farm products, (2) reduction in the very large losses that now occur in the transportation, processing, and distribution of farm products, and (3) more efficient use of resources invested in food production.[1]

This report analyzes the causes of the slowdown in growth of farm production, reviews steps taken by the regime to speed growth, and assesses the options open to Soviet leaders for investment in and management of the food production chain. Finally, we assess the likely outcome of these options.

The Record of the 1970s

During the 1970s, average annual rates of growth in Soviet farm output fell below rates achieved in the United States, Canada, and in all of the East European countries—a reversal of the situation in the late 1960s, when growth of Soviet agricultural production exceeded that of the United States, Canada, and Eastern Europe. Although, by the late 1970s, Soviet farmers had made impressive gains in crop yields and in output of livestock products (table 1) and net farm output was about 50 percent above that in 1961-65, nearly all of this increase had occurred by 1975. As a result, since the mid-1970s, growth in farm output has failed to match the rapid growth in demand for food, especially livestock products (figure 1). Although the

Figure 1
USSR: Average Annual Rates of Growth in Farm Output, Selected Periods[a]



[a] Because of wide swings in annual output due to weather, growth rates are calculated from three-year moving averages for the terminal year and the base year of a five-year period.

303597 9-84

25X1

25X1

25X1

25X1

[1] This report defines "food production" to include all aspects of producing, processing, and marketing food and nonfood farm products, such as tobacco and natural fiber. The term also includes activities of industries supplying such goods as machinery, fertilizer, and feed additives to farms, as well as industries supplying machinery for food processing. In Soviet parlance, this highly aggregative view of agriculturally related activity is termed "agro-industrial complex."

Table 1
USSR: Output Indicators of Major Farm Products

	1961-65	1976-80		
		Actual	Projected From 1961-75 Trend	Actual as a Share of Projected (*percent*)
Crop yields (*average annual, metric tons per hectare*)				
Grain	1.02	1.60	1.71	94
Potatoes	9.40	11.76	12.76	92
Cotton	2.06	2.93	3.15	93
Sunflower seed	1.12	1.18	1.46	81
Flax	0.26	0.34	0.44	77
Sugar beets	16.50	23.70	26.19	90
Livestock products (*average annual, million tons*)				
Meat	9.3	14.8	15.9	93
Milk	64.7	92.6	103.4	90
Eggs (*billion*)	28.7	63.1	65.3	97

25X1

regime emphasized the need to increase output of livestock products and imported record quantities of grain to boost feed supplies, meat production in 1980 was less than 1 percent over 1975 levels. Milk production declined steadily during 1978-80.

At the same time, production costs on Soviet farms rose sharply because of increases in wages and rising prices of machinery, fertilizer, and other goods and services. Prices paid by the state for agricultural products did not keep pace, and profitability fell—especially for livestock products. As profits declined, farms relied increasingly on bank loans to cover current costs. According to Soviet statistics, net income of collective farms from the sale of farm products exceeded production costs by only 7 percent during the period 1979-80, compared with 18 percent during 1976-77 and 24 percent during 1971-75. On state farms, profits during 1976-80 were half of those realized during 1971-75. Although a large, unsatisfied demand for livestock products was apparent, the structure of existing procurement prices encouraged farms to divert resources into crop production. Figure 2 compares production costs and profits during the period 1979-80 with a representative period in the 1960s.[2]

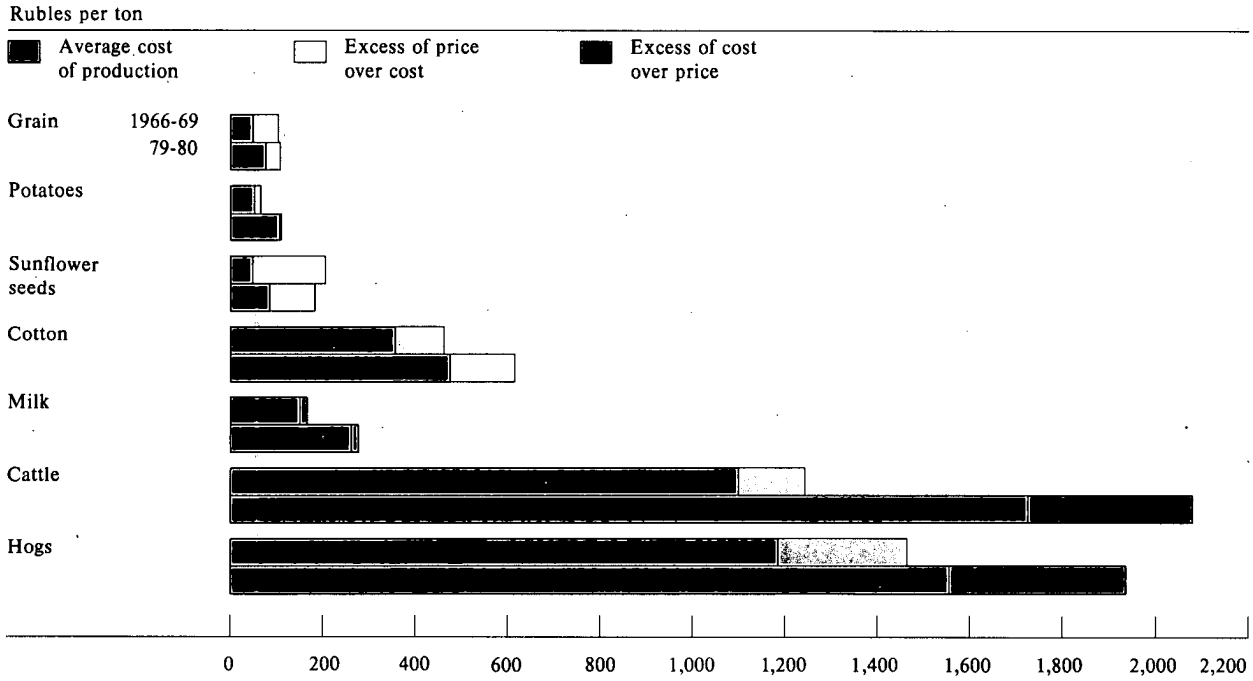
25X1
25X1

Moscow responded to the deteriorating performance in agriculture by increasing hard currency outlays on farm products. In the late 1960s and early 1970s, the USSR had been a net exporter of grain and meat. By crop year 1981/82, grain imports reached 46 million tons, and, with meat imports of nearly 1 million tons,

[2] In the USSR there is only a weak link between profits and managerial decisionmaking. All the evidence suggests that, regardless of relative profit rates for farm products, farms make only very marginal shifts in patterns of product output. Moreover, with the exception of a low rate of depreciation, Soviet cost measures exclude returns to capital and therefore understate the true costs of producing farm products. Because cost measures also exclude returns to land, costs of crop production probably are understated relatively more than those of livestock products.

25X1

Figure 2
USSR: Production Cost and Procurement Prices on Collective Farms, Selected Products, 1966-69, 1979-80



25X1

303598 9-84

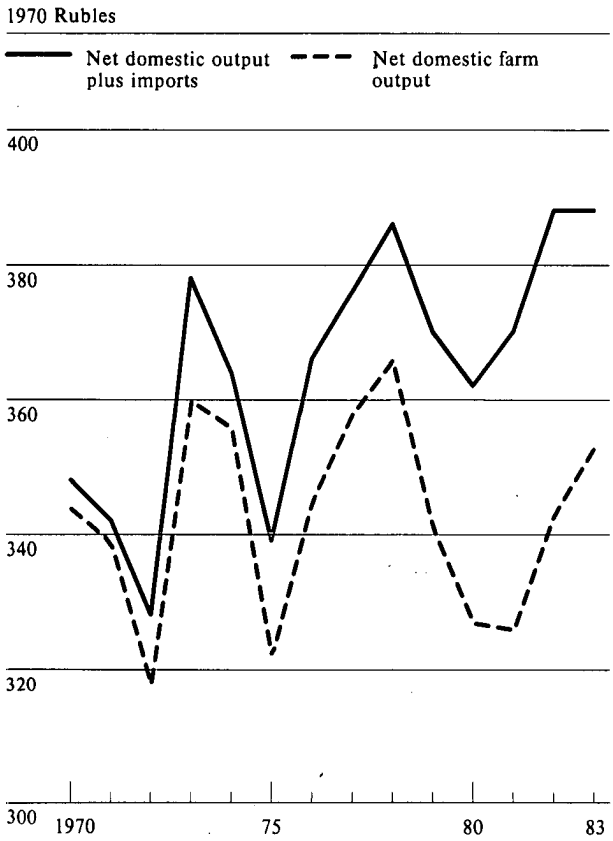
the USSR was the world's largest grain and meat importer.[3] During 1978-82, Moscow spent $26 billion on imports of farm products, more than one-fifth of its total hard currency import bill. Nearly all of the boost in per capita availability of farm products during 1976-80 was attributable to a tripling of net agricultural imports (figure 3).

25X1

[3] The figure for grain imports includes rice and the grain equivalent of flour.

25X1

Figure 3
USSR: Per Capita Availability of Farm Products



303599 9-84

Causes of the Recent Slowdown

The near stagnation of farm output in the last half of the 1970s and early 1980s is related partly to a deterioration of weather conditions. Climate data suggest that unusually favorable weather was a major source of growth in output of farm products from 1964 to 1974.[4] The weather experienced in the 1979-82 period was on average much less favorable than that of 1964-74 and was also less favorable than long-term average weather conditions. Nevertheless, in recent speeches, Soviet leaders have indicated that yields should have been higher despite the weather. Indeed, the experience of countries with similar climatic conditions suggests that the USSR has the potential for higher and more stable yields than are being realized (see inset).

[4] Russell A. Ambroziak and David W. Carey, "Climate and Grain Production in the Soviet Union," *Soviet Economy in the 1980s: Problems and Prospects*, Joint Economic Committee, Congress of the United States, Washington, DC, 1982, pp. 109-123.

US and USSR:
Comparison of Crop Yields and Productivity

Yields for most major crops in the USSR are below those in climatically similar areas of the United States. The following tabulation compares average annual Soviet yields in tons per hectare during 1976-80 for selected crops with yields in regions of the United States with similar soil and climate conditions:

Crop	*USSR* (metric tons per hectare)	*United States* (metric tons per hectare)	*USSR as a Percent of United States in 1976-80*
Wheat	*1.46*	*1.78*	*82*
Potatoes	*11.76*	*17.34*	*68*
Sunflower seed	*1.18*	*1.36*	*87*
Hay	*1.78*	*4.00*	*44*

In these comparisons Soviet wheat yields have been discounted by 11 percent to eliminate the excess moisture and extraneous material that is included in official yield statistics. The comparison of hay yields includes all hay for the United States and hay from annual and perennial grasses for the USSR.

Western scholars, furthermore, have estimated that the combined productivity of land, other productive assets, and labor in Soviet agriculture is about one-half to two-thirds of that in comparable areas of North America.[a] *While productivity of goods and services used in farm production in the USSR declined in the 1970s, productivity increases were being achieved in the United States.*

[a] *D. Gale Johnson and Karen McConnell Brooks*, Prospects for Soviet Agriculture in the 1980s, *Indiana University Press, 1983, p. 23.*

Inefficiency, poor management, and other factors unrelated to climate have contributed to the slowdown in production growth. In general, these factors can be summarized as:

- Failure to maintain previous rates of growth in goods and services used in farm production.
- A decline in the productivity with which these inputs are used.
- Increasing dependence of agriculture on the rest of the economy for inputs and the distribution of its production in an efficient manner
- Failure to adjust investment policy appropriately.

25X1

Lagging Deliveries of Goods and Services to Farms

Growth in all major inputs to farm production—labor, land, fixed capital, energy, fertilizer, and livestock herds—slowed in 1976-80. Total combined inputs grew at an average annual rate of 1.7 percent, compared with 2.5 percent in 1971-75. Deliveries of trucks, tractors, and fertilizer, as well as gross additions of irrigated and drained land were further below plan targets in 1976-80 than in 1971-75. At the same time, the number of tractors and grain combines grew faster than the number of qualified operators, contributing to downtime of farm machinery [5] (figure 4).

25X1

Declining Efficiency in the Use of Available Resources

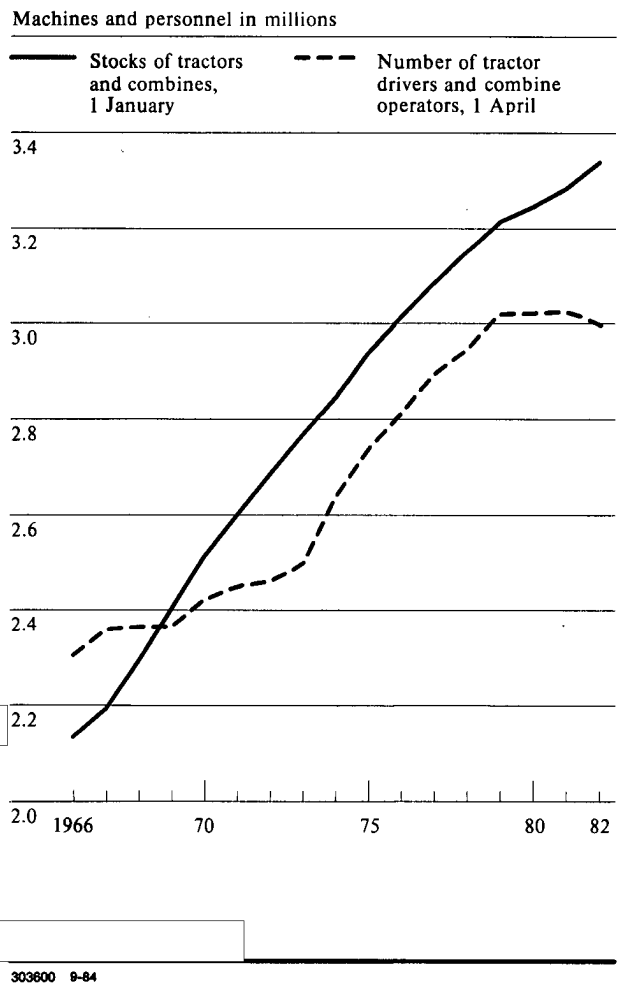
The slowdown in the growth of goods and services used by farms could have been mostly offset if available resources had been utilized as efficiently as they were in the 1960s. A comparison of trends in output and inputs shows that overall factor productivity increased on average by 1.3 percent per year for the 1960s followed by a decline of 1.2 percent per year in the 1970s [6] (table 2). If the productivity increases of the 1960s had been maintained, the average annual rate of growth in output in the 1970s would have been nearly 3.5 percent instead of the 1 percent realized.

25X1

[5] To help fill this gap, truckdrivers and mechanics are sent to farms temporarily from industry and the military. Because of their inexperience in the use of power machinery in cultivation and harvesting, they are, on average, less efficient than the farm's regular staff of machinery operators.

[6] Growth in factor productivity measures the increase in production not explained by increased use of capital, land, labor, and other inputs. Gains in factor productivity stem from new technology, qualitative improvement in management, health and education of workers, and anything else not accounted for by increases in the quantity of conventional inputs.

Figure 4
USSR: Stocks of Tractors and Grain Combines and Number of Operators, 1966-82



25X1

The type of problems that caused the decline in productivity include:

- An increase in downtime of agricultural machinery, which, according to Soviet sources, was not attributable to weather conditions. At the beginning of the present five-year plan period (1981-85), for example, 20 to 25 percent of available tractors were not being used in production.

25X1

25X1

25X1

Table 2
USSR and United States: Changing Productivity in Agriculture

Average annual percent rates of growth

	1951-60	1961-70	1971-75	1976-80
Net output [a]				
USSR	5.3	3.0	1.6	0.3
United States	2.1	1.1	2.4	1.4
Goods and services used in production [b]				
USSR	2.7	1.7	2.5	1.7
United States	0.1	NEGL	0.5	1.2
Factor productivity				
USSR	2.5	1.3	−1.0	−1.4
United States	1.9	1.1	1.9	0.2

[a] Calculated from a three-year moving average for the base and terminal year in each period. Net output is the value of gross agricultural production minus the value of farm products consumed in the production process.
[b] Includes labor, fixed capital (buildings, structures, machinery, and equipment), materials purchased from outside agriculture (fuels and lubricants, electric power, fertilizer, some processed feeds, and current repairs of machinery and buildings), land, and livestock herds. The several inputs are aggregated into a geometric production function of the Cobb-Douglas type in which each input is weighted with its relative contribution to total output in the period.

Figure 5
USSR: Productivity of Livestock Feed, Socialized Sector

[a] The index is calculated from a three-year moving average. Total livestock feed in terms of "feed units" is derived by aggregating quantities of various livestock feeds using a set of weights that measures their feed value relative to that of oat grain.

303601 9-84

25X1

- A fall in the daily hectarage worked by grain combines and other harvesting machinery, according to Soviet statistics. During 1978-79, less area was worked than during the late 1960s, despite increases in the size and speed of machinery.

- Low payoff from increased use of fertilizer. We estimate that, during 1976-80, average annual fertilizer applications per hectare of cropland were 30 percent above the average for 1971-75. Between these two periods, average annual crop yields rose by only 7.5 percent.[7]

- A sharp fall in the growth rate of gross value of livestock output from each feed unit on state and collective farms after 1970, according to our calculations. Expansion of livestock herds more rapidly than feed supplies contributed to this decline as did a deterioration in the structure of rations (figure 5).

[7] An index of overall crop yields is calculated by (1) weighting yields of 17 major crops, including hay and corn for silage, according to their relative importance in the value of crop production in 1970 and (2) calculating an index of the weighted crop yields.

25X1

- Largely ineffective policies to stimulate better use of resources. For example, in the mid-1960s, collective farmers were guaranteed basic wage payments regardless of crop yields, crop quality, or costs. As a result, urban-rural income differences narrowed, but farmers were left with little incentive to maintain or increase efficiency to minimize the effects of the poor weather and materials shortfalls that occurred more frequently in the 1970s.

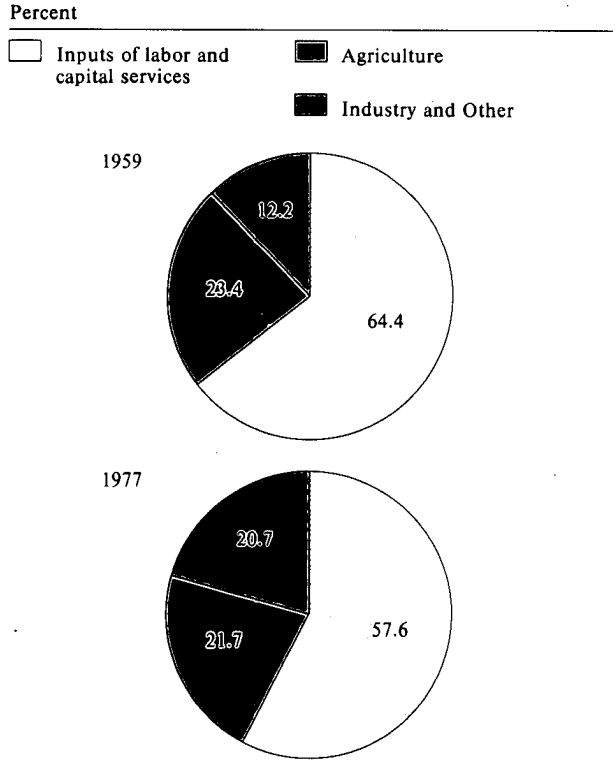
25X1

Increasing Complexity of Producing and Marketing Farm Products

During the 1970s, economic interaction between agriculture and other sectors of the economy increased. Deliveries of goods and services by industry comprised

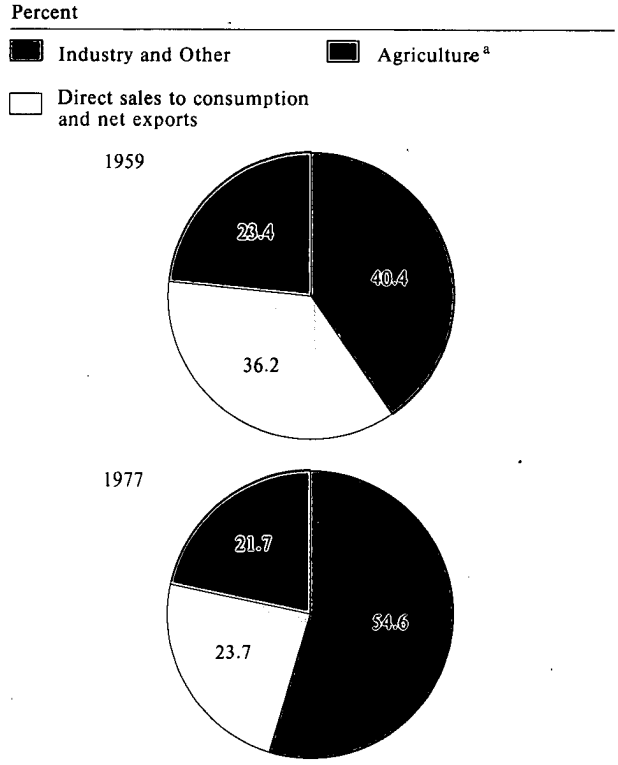
25X1

Figure 6
USSR: Sources of Goods and Services in Agricultural Output, 1959 and 1977



303602 9-84

Figure 7
USSR: Allocation of Output of Agriculture, 1959 and 1977



[a] On-farm use of agricultural products consists largely of self-produced feed for livestock. Also included are crops used for seed purposes and hatching eggs.

25X1

25X1

303603 9-84

a growing share of the gross value of farm products. The share of farm production going to industry for processing also increased (figures 6 and 7).[8] The increases in these shares indicate that the web of interdependence between agriculture and other sectors expanded in the 1970s. Synchronizing these transactions to ensure timely delivery to farms of materials such as fertilizer and feed ingredients and prompt processing of farm products became increasingly difficult. Until implementation of the Food Program in 1982, there was little effort to coordinate activities of farms, industrial enterprises, and service organizations all managed by different ministries and departments.[9]

25X1

[8] Soviet statistics on interindustry transactions (only available for benchmark years) show that the share of gross agricultural output being supplied to industry as raw materials increased from 40 percent in 1959 to an estimated 55 percent in 1977. A recent Soviet journal article noted that this share reached 60 percent in 1980. (According to US statistics on interindustry transactions, 66 percent of US farm output was transferred to industrial sectors for processing in 1972.) At the same time, delivery of goods and services to agriculture in the USSR has increased. In 1959 about 12 percent of the gross value of agricultural output was accounted for by goods and services purchased from industry and other nonagricultural sectors. We estimate that this share reached 21 percent in 1977.

[9] See page 16 for a brief review of the highlights of the Food Program with special emphasis on the new organization and management forms adopted.

25X1
25X1
25X1

As a result of increasing friction and delay in coordinating food-related production, even with the rise in "off-farm" provision of inputs, farms have allocated an increasing share of their own resources for activities that are supposed to be provided by specialized service organizations over which the farms have no direct control.[10] The ruble value of industrial, construction, and transportation operations carried out directly by farms doubled from 1970 to 1979, partly because service organizations charge high prices and provide inadequate response to farm needs.[11] Soviet writers complain that this "despecialization" is causing unnecessary duplication of facilities, thus diverting farm resources, including labor, from crop raising and animal husbandry, as well as increasing production costs.[12]

Another related problem involves transportation losses, which have increased largely because of:

- A grossly inadequate farm-to-market road network.
- Lack of modern transportation equipment.
- A rate structure that sets prices for transport services below costs.
- A gradual increase in the average length of haul for farm products.
- Inadequate incentives for procurement agencies and transportation organizations to prevent damage and spoilage in transportation.[13]

As a result, according to Soviet sources, transportation organizations have not kept pace with the growing requirements for delivering industrial goods to farms and for shipping farm products to processors.

25X1

Failure To Adjust Investment Policy Appropriately

Since the late 1960s, investment in agriculture and its supporting industries (here termed food production) has amounted to one-third of total investments in the Soviet economy.[14] Cumulative investments in food production in the 1970s grew by 125 percent over cumulative levels of the 1960s, compared with an increase of 80 percent for the balance of the economy. Despite this generous support, growth in agricultural production diminished rapidly in the 1970s.[15] Several investment decisions are partly responsible for the present slow growth in food production.

25X1

25X1

First, planners reduced the share of investment going to industries supporting agriculture. Because of insufficient investment in machine-producing plant and equipment, for example, much of the agricultural equipment currently produced in the USSR is obsolete and of low quality. Only half of the specified types of machinery needed by agriculture are, to date, in series production. Even while in series production, there frequently is an insufficient supply. For example, the new, larger tractors are being utilized at only 50 to 60 percent of capacity because only half of the necessary attachments are being produced. The shortage of specialized equipment to carry out technically advanced farm operations, such as the application of liquid fertilizer, is especially critical. Moreover, there is insufficient machinery adapted to specific farming conditions in various regions of the country.

25X1
25X1

[10] The three major service organizations are the State Committee for the Supply of Production Equipment for Agriculture (*Sel'khoztekhnika*), the All-Union Scientific Production Association for Agro-Chemical Service to Agriculture (*Sel'khozkhimiya*), and the Ministry of Land Reclamation and Water Resources. The majority of Soviet farms are subordinate to the Ministry of Agriculture, which has no authority over the service organizations or their parent ministries and state committees.

[11] In the RSFSR, for example, from 1975 to 1982 the price charged to farms by *Sel'khozkhimiya* for applying lime to 1 hectare more than doubled. Over the same period, costs for current repair of tractors and grain combines by *Sel'khoztekhnika* went up by 27 percent and 35 percent, respectively.

[12] From 1970 to 1979, the value of construction, transportation, and industrial activity on farms increased from 20 to 25 percent of total farm operations. Statistics on the total value of farm operations are rarely published. In preparing the annually published figures on the gross value of farm production and the occasionally published input-output tables, Soviet planners count the value of these nonagricultural activities carried out by farms in industry, construction, and so forth. At the same time, agricultural activity carried out by industrial enterprises on their subsidiary farms is counted in official statistics on the farm sector. The shares of production shown in figures 6 and 7 are based on input-output statistics and do not include nonagricultural activity.

[13] The increase in the average length of haul is related to the closing of small food-processing enterprises and peripheral procurement points as the capacity of large, centrally located food-processing enterprises increased.

[14] In addition to direct investment in farm machinery, equipment, and construction, this measure of "agricultural investment" includes allocations to ministries providing goods and services to agriculture, such as fertilizer, pesticides, machinery, mixed feed, repair services, roads, storage, and transportation facilities; the Ministry of Procurement; and ministries managing off-farm food-processing enterprises.

25X1

25X1

[15] From 1970 to 1980, the stock of equipment, buildings, and structures for use in farm operations more than doubled, while output of crops and livestock products increased by less than 10 percent (based on three-year moving average). During 1976-80, on average it took additional capital stock worth 13.3 rubles to generate an additional ruble's worth of farm output. These capital requirements per unit of additional output are seven times those of 1966-70 and almost three times those of 1971-7

25X1

25X1

Second, excess emphasis was placed on construction of livestock facilities. The misplaced priority given livestock facilities, together with increasing construction costs and the rising retirement rates for farm machinery, has resulted in an increase in the share of buildings and structures on state and collective farms from 48 percent of capital stock in 1965 to 63 percent in 1980. One Soviet writer claims that plant and equipment for animal husbandry is now five times the 1960 level, and livestock output has increased by only 1.5 times. Production of livestock products has not increased proportionately, because new capacity has been allowed to stand idle and because the quantity and quality of feed supplies have been insufficient.[16]

Finally, during 1971-75 the share of investment going to rural housing and infrastructure was cut. According to Soviet press reports, primitive living conditions in rural areas contribute heavily to outmigration and to the present shortage of younger, skilled workers.

Options for Investment in the 1980s

The Current Plan

Investment policy for the 1980s is largely intended to compensate for perceived misallocations of the past. Although growth in investment allocations will be slow in the 1980s, compared with the 1970s, food production will continue to receive about one-third of investment resources. During the 1980s, a larger share of farm-sector investment resources is to be allocated to improving rural infrastructure and to increasing capacity in food-processing and in farm machinery production. Investment in large livestock complexes is being reduced. Soviet policymakers believe that higher priority for storage, processing, and distribution facilities will cut losses and increase the quality and quantity of farm products delivered to the consumer.

According to Soviet plan documents, investment allocations to food production in 1981-85 will be only about 9 percent above 1976-80 levels. However, investment both in agriculture and elsewhere in the economy grew at above-plan rates during 1981-83. In 1986-90, investment growth is planned to pick up slightly but is to remain below rates of the 1970s (table 3). 25X1

Resource-Producing and Food-Processing Industries. To build up the "weak links" in the food production chain, resource-producing and food-processing industries will receive a larger share of total investment in food production. In 1981-85, investment in the farm machinery industries is slated to rise 50 percent over 1976-80 levels, compared with a 23-percent increase for industry as a whole. Soviet planners reinforced the priority by issuing a special decree in April 1983 calling for an additional boost in production of agricultural machinery in 1983-90. As a result, press reports and comments by a Soviet official suggest that further increases in investment in the relevant machinery will be made in the last half of the 1980s. Despite this generous support, substantial improvements in the quality and assortment of machinery available to farms probably will not occur until after 1990, because the process of designing, testing, and producing new machinery in the USSR is still very slow. 25X1 25X1

According to Soviet plan documents, the main increases in investment in the food-processing industry will not occur until 1986-90. We believe that present increases in such allocations are being spent on food-processing facilities to reduce postharvest losses. Additional support for the food-processing industry is to come from imports. We estimate that by 1986-90 imports of food-processing equipment, mainly from Eastern Europe, could be as much as double those of 1976-80. 25X1

The Farm Sector. Investment in state and collective farms and agricultural service organizations will increase by about 11 percent in 1981-85 over the period 1976-80. The machinery portion of investment is to rise by about 13 percent, compared with 8 percent for total construction, including rural housing and infrastructure. Growth in both components of investment is to accelerate slightly in 1986-90. Major investment priorities for farms are detailed below. 25X1 25X1

[16] A lack of raw material and the necessary preparation equipment have contributed to recent feed shortages.

Table 3
USSR: Agriculturally Related Investment

	1966-70		1971-75		1976-80		1981-85		1986-90	
	Billion 1973 Rubles	Percent of Total	Billion 1973 Rubles	Percent of Total	Billion 1973 Rubles	Percent of Total	Billion 1973 Rubles	Percent of Total	Billion 1973 Rubles	Percent of Total
Agro-industrial complex	106.3	100.0	165.0	100.0	213.0	100.0	233.0	100.0	265.0 [a]	100.0
Farm sector	81.5	76.7	131.1	79.5	171.0	80.3	189.6	81.4	213	80.4
State and collective farms	74.1	69.7	118.4	71.8	155.2	72.9	172.5	74.0	NA	NA
Machinery and nonresidential structures used in agricultural production	59.7	56.2	99.2	60.1	128.4	60.3	134.6	57.8	NA	NA
Rural housing, roads, and communal services	14.4	13.5	19.2	11.6	26.7	12.5	37.9	16.3	55	20.8
Agricultural service organizations [b]	7.4	7.0	12.7	7.7	15.9	7.5	17.1	7.3	NA	NA
Production of goods used in farm operations and food processing [c]	24.8	23.3	33.9	20.5	29.2	13.7	33.0	14.2	40	15.1
Other [d]					12.8	6.0	10.4	4.5	12	4.5

[a] Estimated on the basis of (1) Mikhail Gorbachev's statement that investment in the 1980s would total about 500 billion rubles and (2) the 1981-85 plan for investment.
[b] Includes outlays on various enterprises related to agricultural production such as machinery repair shops, research institutes, processing enterprises, enterprises producing agricultural building materials, and the like.
[c] Resource-producing industries include machine building for agriculture and the food industry, production of fertilizers and livestock feed additives. Food-processing industries include the food industry, milling industry, and meat and milk industry.
[d] Includes fishing, specialized transportation, and enterprises of trade and consumer cooperatives.

25X1

Rural Infrastructure. The most apparent shift in investment in the 1980s is to result from growth in allocations for rural housing, schools, and roads. These annual allocations are to increase faster in the 1980s than in 1976-80 and are to amount to more than 20 percent of total investment in food production in 1986-90. Although Soviet policymakers consider improving rural living standards a very important element in reducing out-migration of the better qualified workers, major improvements will not occur quickly. Moreover, we believe that this program would be one of the first to be cut if Moscow is forced to raise the priority of other investment projects either on farms or in other sectors of the economy.

25X1

Investment in paved roads is needed badly to reduce high transportation costs and reduce losses in marketing of farm products.[17] Soviet sources claim that only 20 percent of the farm roads used to move workers to jobs, feed to livestock, and machinery to fields are paved. More paved farm roads would increase the productivity of farm machinery, reduce fuel use, lessen the need for farm machinery repair, and increase the attractiveness of living in rural areas. The inadequate network of interfarm and market roads, furthermore, limits marketing of farm products as well as deliveries of goods used in farm production. One Soviet writer claims that the lack of roads is responsible for losses of 10 percent of farm production. Even if plans for road construction are met, paved roads will be available to less than two-fifths of farms by 1990. Without adequate roads, some of the benefits of planned increases in storage capacity for perishable products would be lost.

25X1

25X1

[17] Costs of transportation rose by one-fourth in the 1970s and are as high as 30 percent of total costs for some products. In the United States, for example, rail and truck transportation costs amount to about 5 percent of the farm production and marketing bill.

25X1

On-Farm Construction. Most of the increase in allocations for construction will go for rural housing. Moscow is planning to hold 1981-85 allocations for nonresidential buildings and structures at about 1976-80 levels. Construction of new storage facilities for vegetables, fruits, potatoes, forage crops, and industrially produced commodities such as fertilizer are to be the highest priority construction projects. At the beginning of the 11th Five-Year Plan, on-farm storage was sufficient for only 65 percent of the potato harvest, 30 percent of the fruit harvest, and 15 percent of the vegetable harvest.[18] Less than 20 percent of hay and feed-root crops are adequately stored. In addition to more storage capacity, better incentives for workers and managers throughout the production process and substantial increases in machinery, equipment, and transportation and handling facilities are needed to reduce losses and maintain product quality.

During the 1980s, the costs of increased capacity for livestock production will fall as renovation and expansion of existing facilities replace new construction as the primary form of new investment. On state and collective farms of the RSFSR, for example, investment in animal husbandry, excluding feed production, is to fall from one-half to one-third of productive investment in 1981-85, compared with 1976-80.

Farm Machinery. Soviet policy toward investment in farm machinery emphasizes expanding the assortment and improving the quality and reliability of farm machinery stocks. Planners are counting on increased stocks of farm machinery to offset the effects of the continuing decline in the agricultural labor force. Growth in stocks of basic machinery such as tractors and grain combines is to be accomplished by holding deliveries at or slightly above those targeted for 1976-80 and, at the same time, reducing retirement rates. Even if plans for the delivery of agricultural machinery are fulfilled, the 1985 goals for stocks of tractors and grain combines will not be met by the end of the decade if retirement rates remain at 1976-80 levels.

To reduce retirement rates Moscow must:

- Improve incentives on farms to use and maintain machinery properly.
- Increase the number of trained machinery operators relative to the number of tractors, grain combines, and other harvesting machines.
- Make repair organizations responsive to farm needs.
- Improve incentives for industry to respond to farm needs and to provide a wider assortment of better quality machinery.

25X1

So far in the 1981-85 plan period, retirement rates for tractors, grain combines, and for several types of harvesting and irrigation machinery have been reduced somewhat. In 1981-82, however, deliveries of this equipment were below plan and, in some cases, even below 1980 levels

25X1

Land Reclamation. Moscow plans to increase investment in irrigated and drained land in the 1980s despite recent criticism by Gorbachev and others of the poor maintenance and low payoff of many reclamation projects. We expect land reclamation to continue to absorb about 22 percent of investment in state and collective farms in the 1980s. It is possible, however, that in the future these funds will be concentrated on improving and making better use of land already reclaimed instead of making large additions to stocks of reclaimed land. Although the program is expensive and is moving slowly, it has the potential to help stabilize crop yields and improve regional self-sufficiency in crop production.[19]

25X1

25X1

25X1

Other Options

In view of the intense competition for investment goods among the various sectors of the economy, Moscow may decide, under certain conditions, to trim the share going to food production in the late 1980s. Returns to aggregate investment would be larger if investment were shifted away from farms, because farms require larger additions to capital to obtain

25X1

25X1

25X1

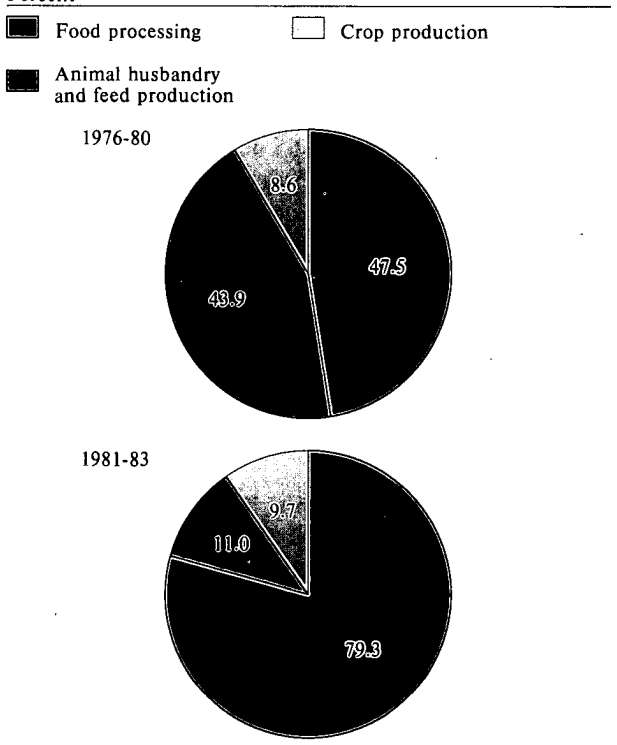
[18] Excludes private-sector production of potatoes, vegetables, and fruits on small household plots. These shares would be more than adequate for a market economy. In the USSR, the inefficient system for procurement and processing requires that very large shares of perishable crops be put in storage on farms.

additional production than most other sectors of the economy.[20] We believe that investment cuts affecting agriculture are more likely if the weather is better than average over the next few years and farm output increases at rates judged acceptable by the leadership. With poor weather and stagnating production, Moscow is unlikely to reduce investment in agriculture, despite demand in other sectors and agriculture's relatively inefficient use of capital.

If investment in food production now planned for 1986-90 is trimmed, we expect selective cuts to come in the traditional low-priority areas of rural housing and food processing. Farm production is likely to maintain its priority as is the production of agricultural machinery.

Soviet planners may also consider increasing imports of Western food production equipment to relieve pressure on domestic machinery industries. Indeed, Soviet trade officials have recently expressed heightened interest in a wide range of Western equipment and technology for food production.[21] During 1981-83, orders of Western machinery and equipment for food production and processing increased slightly as a share of total orders of machinery and equipment from the West. Within the category of orders supporting food production, recent emphasis has been on equipment for food processing (figure 8). We expect this emphasis to continue, although orders of food-related machinery and equipment probably will not exceed 5 percent of all orders of machinery and equipment from the West. Soviet trade officials have indicated that foreign technology will supplement domestic development of farm machinery. The Soviets intend to import technology and complete factories for producing machinery rather than importing large numbers of individual machines. Many of the general problems the Soviets face with Western technology

Figure 8
USSR: Structure of Imports of Western Equipment and Technology for Food Production



303604 9-84

[20] Agriculture's relatively high capital requirements are partly the result of past misdirection of investment resources in agriculture. During 1976-80, to increase the value of production by 1 ruble, the machine-building industry required only 2.5 rubles' worth of new capital stock compared with 13.3 rubles for Soviet farms. Comparable capital requirements for other sectors are 5 for the chemical industry, 5.5 for food processing, and 6 for fuels and power. Capital stock is a complement as well as a substitute for labor services. Because of the stringency in labor supplies during the 1980s, these output/capital relationships would not be the only criterion used. For example, increased capital is expensive but of particular benefit to agriculture, where opportunities for labor-saving investment are greater and planners are anticipating a long-term decline in the number of workers and an increase in the average age of the remaining labor force.

[21] In the past, imports of Western technology for food production have had low priority. Of the $18 billion in machinery and technology ordered from the West in 1976-80, only 3 percent was devoted to agriculture and food processing. These orders, furthermore, were very small, compared with the $250 billion equivalent invested by the USSR in the farm sector and in food-processing industries during 1976-80. (Expressed in 1976 dollars. Soviet investment in rubles is converted to dollars using the geometric mean of US and Soviet weighted purchasing-power parities for farm and food-processing machinery.)

(such as inadequate maintenance and spare parts, shortages of skilled labor, and underuse of capacity), however, would be especially severe for the widely dispersed farm sector. Food-processing plants and machinery producers, which have a larger payoff than farms, might make better use of imported technology, provided that raw-materials shortages did not interfere.

Coping With Demand for Other Industrial Goods

Soviet plans indicate that farm-sector purchases of industrial goods (fertilizer, energy, feed ingredients, spare parts, and so forth) are to increase on average at about 3.5 percent per year in the 1980s. During 1981-83, these deliveries grew at the above-plan rate of 4.1 percent per year. We estimate, however, that average industrial growth in the 1980s may be too slow to sustain current or even planned growth in deliveries to farms unless planners give very high, continuing priority to supporting the Food Program. During the 1960s and 1970s, purchases by agriculture from industry grew faster than industrial production, but the gap between the growth rates was much smaller than that projected for the 1980s.[22] Industry will be further burdened by plans for the 1980s that call for increases in industrial goods to food-processing plants and to producers of fertilizer and machinery. Many branches of industry probably will be under pressure to economize on raw materials and energy and are likely to face failure of their own suppliers to deliver high-quality inputs.

Resource-Producing and Food-Processing Industries

The payoff from new production facilities in the industries that produce machinery and process foodstuffs will be small without support from other branches of industry. Machinery producers need more reliable, higher quality deliveries of tires, rubber, plastic components, and rolled metal, in addition to new production facilities. Producers of agricultural chemicals need a more regular supply of high-quality raw materials and packaging for herbicides, insecticides, seed-treatment chemicals, and livestock feed additives. Food processing has long been constrained by shortages of packaging and food preservatives. If deliveries continue to fall far short of plan, returns to new investment will be low. 25X1

Moscow's main strategy for dealing with these shortages has been to saddle producers with new plan tasks and instructions to raise the priority of deliveries to enterprises involved in food production. In some cases, 25X1
such as the paper industry, orders to step up deliveries of packaging material have been accompanied by commissionings of new production capacity, enhancing the chances of success. 25X1

Farms

Chemical Fertilizer. Soviet agriculture needs an additional 19 million tons of fertilizer nutrients annually to increase applications to "recommended" levels for all crops.[23] Plans, however, call for an increment in deliveries of only 12.2 million tons by 1990, which will bring the total to 65 percent more than in 1980. Almost the entire increase in fertilizer deliveries will be needed for grain and forage crops (annual and perennial grasses, pasture, and corn for silage).[24] The Soviets plan to double applications of fertilizer on grain. Given the current returns to fertilizer, this increase would raise grain yields by 0.2 to 0.3 tons per hectare by 1990 over annual average yields of the 1976-80 period.[25] 25X1

[22] During 1961-70, purchases grew at an average annual rate of 6.8 percent, and industrial production grew by 6.4 percent. The comparable figures for 1971-80 are 4.9 percent for purchases and 4.6 percent for industrial production.

[23] Soviet planners establish norms for fertilizer application according to the yield response of crops to fertilizer in various parts of the country. All the evidence indicates that the cost of fertilizer and the profitability of its use are not important considerations in establishing application norms, but play a role in the process of allocating available supplies of fertilizer among farms. 25X1
25X1
25X1

[24] Potatoes, vegetables, and industrial crops already receive fertilizer close to recommended amounts. According to Soviet norms, however, grain crops require an additional 12 million tons of fertilizer. The area sown to annual and perennial grasses and corn for silage requires 7 million tons. If natural haylands, meadows, and pastures were included in the calculation, fertilizer requirements for forage crops would be 2-5 million tons higher. 25X1

[25] Soviet plans imply that, in the 1980s, each additional kilogram of chemical fertilizer nutrients must provide 4 to 5 additional kilograms of grain—approximately the returns obtained in the late 1970s. Grain yields are slated to rise from 1.6 tons per hectare in 1976-80 to 2.15 tons per hectare in 1990, with fertilizer accounting for about half of the increase. Soviet plans are approximations at best because in practice it is difficult to separate the effects of fertilizer from those of other factors affecting crop yields. 25X1

25X1

We estimate that, once goals for applications to grain have been met and other nonforage crops have been brought up to recommended levels, a maximum of 4-5 million tons of fertilizer would be available to increase applications on forage crops. These quantities, however, will not be sufficient to provide growth in production of forage crops at rates needed to meet plans for feed production.

We believe that production problems in the Soviet fertilizer industry will keep deliveries from reaching plan levels.[26] The shortfall, however, is not likely to be as large as that of 1976-80. Furthermore, we anticipate limited growth in output of phosphorous nutrients relative to nitrogen and potassium in the 1980s.[27] A shortfall in the availability of phosphorous fertilizer will hold down the payoff from plans to increase fertilizer use in the dry regions of the RSFSR and in Kazakhstan, where the need for phosphorous fertilizer is greatest. These important grain regions currently use little fertilizer but are to account for an increasing share of allocations to grain in the 1980s.

The most pressing problem related to fertilizer in the 1980s will be to keep marginal returns to fertilizer applied to grain from falling off rapidly and to raise the very low returns now being obtained from applications to potatoes, vegetables, and other crops (figure 9). Soviet farmers have the potential to increase crop response to fertilizer by using it more efficiently. To improve returns to fertilizer requires fewer losses of fertilizer; more timely transportation from factory to farm; more and better application equipment on farms; seed varieties more responsive to fertilizer; more efficient application practices; and greater use of lime, gypsum, and pesticides.[28]

Insufficient quantities of fertilizer, together with problems in delivery and application, will hold Soviet 1990 yields of hay, silage, and other forage crops below present yields in Eastern Europe and below those in analogous regions of the United States and Canada in the 1960s and 1970s. Gains from using additional fertilizer on grain are likely to compare unfavorably with those in climatically similar areas of North America even if fertilizer use and grain yields reach plan levels. 25X1 25X1

Livestock Feed. Soviet farms largely depend on industry to supply complete, nutritionally balanced, mixed feeds. Industry also supplies protein supplements (oilseed meals, bone and fish meal, and single-cell protein) and premixes that include needed vitamins, minerals, and protein that enable farms to produce their own balanced feeds.[29] Although nearly half of the grain used for feed is processed into mixed feed, much of the product is substandard. Roughly half of mixed feed is produced without protein enrichment because the needed raw material is not available. As a result, the mixed-feed industry adds to the cost of producing livestock products without proportionately increasing the efficiency of production. Achieving the 1990 target of processing all grain that is fed into mixed feed is improbable because it places too great a burden on industries that produce the needed supplements such as sugar, vegetable oil, and meat and dairy processing, as well as those that produce chemical and microbiological feed additives. These industries would have to increase deliveries to the mixed-feed industry by, on average, 30 percent over the 1980 level. 25X1 25X1

Soviet feed rations lack balance because, on average, they are about 15 percent short of the quantity of protein required to achieve the maximum output of 25X1 25X1

[27] Although 40 to 50 percent of Soviet soils are deficient in phosphorous, the Soviet fertilizer industry historically has been unable to raise the overall proportion of phosphorous fertilizer relative to nitrogen and potassium. This has limited gains in yields and reduced crop quality and the effectiveness of nitrogen fertilizer.

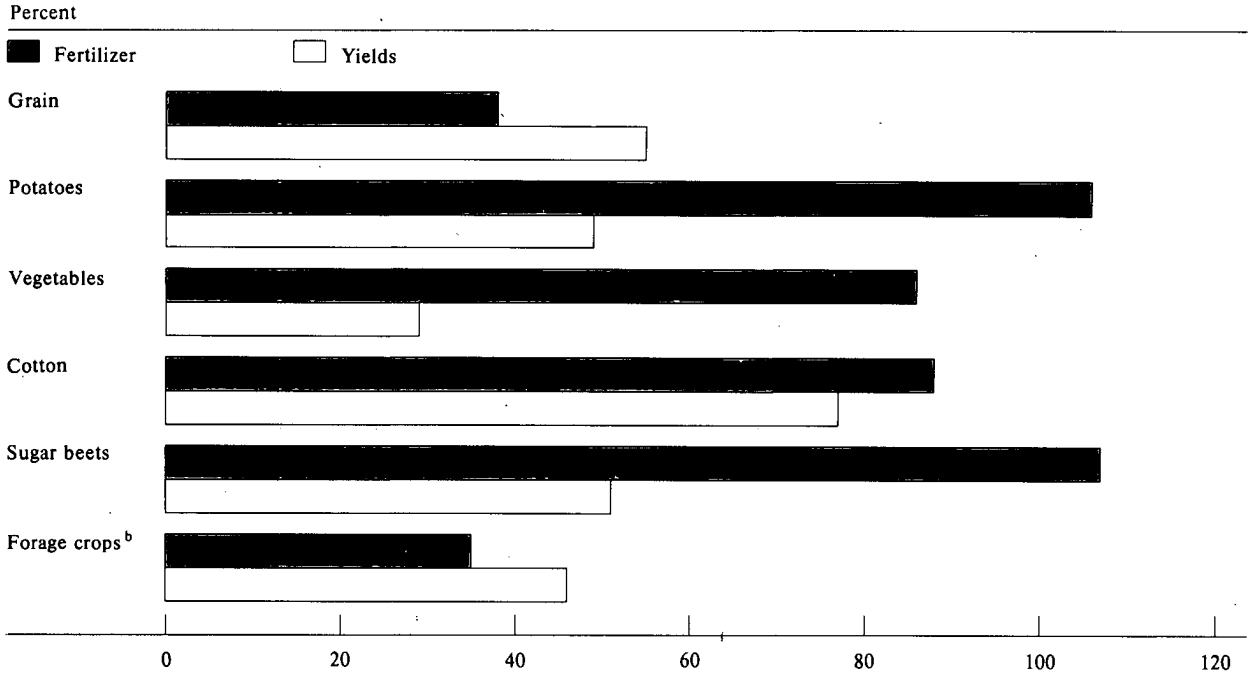
[28] Soviet sources claim, for example, that liming of acid soil increases fertilizer response rates by 20 to 30 percent. Nevertheless, plans to apply lime have been consistently underfulfilled. As a result, areas of acid soil in the RSFSR, particularly the nonblack soil zone, are increasing. Weeds, competing for nutrients, are a major factor in the low response of grain, sugar beets, potatoes, and vegetable crops to fertilizer. In 1980, less than half of grain crops and only one-third of sugar beets received herbicide treatment. Only half of agriculture's overall requirements for pesticides (insecticides, fungicides, and herbicides) are being met. Soviet sources indicate that 60 percent of required supplies will be available by 1985 but that supplies will not be fully adequate until the year 2000.

[29] Three-fourths of mixed feed in the USSR is produced by the Ministry of Procurement, using grain purchased from farms and imported grain. The balance is produced on state and collective farms and in interfarm enterprises. According to Soviet authorities, properly balanced mixed feed can reduce the need for concentrated feeds by as much as one-third. Concentrated feeds are those high in calories, such as grain and oilseed meals, with grain accounting for roughly 85 percent. 25X1

25X1

25X1

Figure 9
USSR: Fertilizer Applications and Crop Yields in 1980 as Percent of Recommended Levels[a]



[a] Recommended levels refer to fertilizer applications and the expected crop yields that such applications would produce if all farming operations were carried out correctly. Because of annual fluctuations in yields, the three-year average (1979-81) is used.

[b] Includes annual and perennial grass and corn for silage. Includes only cultivated forage crops reported in sown area statistics.

25X1

303605 9-84

livestock products for a given quantity of feed.[30] One Soviet writer claims that the protein deficit exceeds 20 percent if losses of protein during harvesting and storage are counted. Plans to reduce the deficit rely on the traditional and thus far unsuccessful strategy of increasing production of protein-rich pulse crops and forage crops such as alfalfa, lucerne, clover, and pulses.[31] We believe that protein from these sources will be well short of plan, creating additional demand for industrially produced protein supplements.[32] With large increases in investment for food-processing industries and a 45-percent increase scheduled for the microbiological industry, which produces single-cell

[30] The lack of nutritional balance, combined with a 20-percent shortage in overall quantities of energy feed, means that it takes about twice as long for cattle and hogs to reach slaughter weight in the USSR as it does in the United States.

[31] Output of pulses, for example, is to average 12-14 million tons per year during 1981-85 and 18-20 million tons during 1986-90, compared with 7 million tons per year during 1976-80

[32] Industry produced an estimated 7 million tons of high-protein feed components (excluding milk products) in 1980. To boost protein content of the average feed ration to the standard levels would have required the equivalent of roughly an additional 11 million tons of soybean meal.

25X1

25X1

25X1

protein and a number of other important feed additives, the capability to produce these important supplements should expand.[33] The flow to farms is likely to increase slowly, however, because producers of feed additives probably will continue to have difficulty in getting raw materials from their own suppliers.

Other Feed Additives and Veterinary Supplies. Soviet technical writers have stated that only 40 percent of the need for antibiotics for livestock feed and for veterinary purposes is being met.[34] A number of other feed additives, such as elements of the vitamin B complex and vitamin A, are also in short supply.[35] Production of important feed additives such as lysine, methionine, and various enzyme preparations needed to improve digestion are far short of demand, even though production has grown substantially since the mid-1970s. Although production of lysine, for example, nearly tripled during the 1976-80 period, the 5,000 tons produced in 1980 covered only 15 percent of demand.

Putting animal husbandry on an industrial basis, which involves concentrating large numbers of animals in relatively small areas, has sharply increased the need for veterinary services to prevent large losses. The extensive shortage of such basic supplies as soaps and disinfectants means sanitary standards are difficult to maintain. Veterinary supplies that are not readily available include vaccines, drugs, syringes, needles, rubber gloves, and laboratory equipment. Industry's ability and planners' willingness to supply these goods has been limited in the past, a situation not likely to change substantially.

Energy. Increasing mechanization on farms will push up agriculture's demand for energy, especially gasoline and diesel fuel. There are few prospects for substituting other fuels for gasoline and diesel fuel in operating agricultural machinery.[36] We expect consumption of petroleum products in agriculture in 1990 to be at least one-third above that in 1980.[37] Without adequate expansion of secondary processing capacity at oil refineries, however, deliveries of light petroleum products to major consumers—transportation and agriculture—could fall short of needs. 25X1 25X1

Changing Agricultural Organization and Incentives

Soviet leaders realize that, unless transactions are more efficiently synchronized between the farms and organizations that supply machinery, fertilizer, and other industrial goods and the organizations that transport and process agricultural raw materials, new investment planned for the 1980s will do little to increase farm output and reduce waste throughout the production process. Better coordination between participants in the food production process requires less cumbersome decisionmaking and more effective incentives for workers to use resources efficiently. In contrast to the situation in China and Hungary, where agricultural organization and management underwent substantial decentralization in the 1970s, Soviet leaders have opted to continue centralized planning and management (see inset). 25X1 25X1

The Food Program

In keeping with concerns related to growing complexity and rising cost, in May 1982 the Brezhnev regime unveiled an agriculture-related program for the 1980s that (1) reorganized the management of food production, (2) redirected investment resources between the farm sector and its supporting industries, (3) revised incentives for farm workers and managers, and (4) listed new targets for production of key agricultural commodities and for allocation of goods and services 25X1

[33] Single-cell protein includes microorganisms such as algae, yeast, molds, and other fungi grown either on byproducts of oil or on organic wastes from agriculture and industry.

[34] Antibiotics are growth stimulators that increase feed efficiency. Moreover, the addition of proper quantities of antibiotics to feed reduces livestock death rates substantially. Soviet authorities report that up to 20 percent of the calf crop is lost each year in some areas, largely because of a lack of prophylactics, chiefly antibiotics, and correct feed rations.

[35] Only two vitamins—D_2 and B_{12}—are supplied in amounts adequate for the enrichment of mixed feed and premixes.

[36] Small increments in natural gas and primary electricity should be available to substitute for oil in operations such as crop drying and in the heating of nonresidential structures. 25X1 25X1

[37] Coal currently accounts for about 20 percent of total fuel use in agriculture. Natural gas is being used more in agricultural processes, but its share of total fuel use is only about 6 percent. 25X1 25X1 25X1

Agricultural Reforms in Hungary and China

The Food Program contrasts markedly with changes made in management of food production in China and Hungary. The net effect of changes in these countries has been to increase output, raise productivity, and lower production costs. 25X1

In both countries, procurement plans have been reduced or abolished, giving farm managers and private producers more opportunity to make production decisions. Although the RAPO concept (see text) offers the possibility of decentralizing management to the local level, Soviet farm managers will continue to have no real autonomy to make decisions that should be made at the farm level, such as what to produce, when to plant, or what machinery to buy. Their Hungarian counterparts do not fulfill centrally determined procurement plans, but plan output according to prevailing prices and the amount of revenue needed to cover labor and material costs. Hungarian farms engage in relatively free trade to acquire machinery, fertilizer, and other goods from industry. These farms are also free to undertake other kinds of production, such as small-scale manufacturing and repair that provide off-peak employment, add revenue, and increase the supply of services and equipment to small farms.

The Chinese "responsibility system" introduced in 1978 replaced strict acreage and production quotas with contracts between the state and a production team or—more commonly—a group or family within the team. These teams consist of 25 or 30 households, somewhat over 100 people. There are six major variations of the new system, ranging from those where planning and management are still highly collectivized to others that resemble individual farming. Western analysts agree that these reforms, together with good weather and increased use of fertilizer and equipment, are responsible for impressive growth in output and productivity. Additional reforms announced by China in 1983 and 1984 go further toward decentralization. These include continued dismantling of communes, reducing the quantity of farm products flowing through state procurement channels, increasing flows of commodities through free markets, and permitting peasants to employ hired labor and subcontract land. 25X1 25X1

Moreover, Hungary and China support the private sector actively. Although the Soviet regime in 1977 ordered greater state assistance for private farmers, support and ideological acceptance of private agriculture falls far short of that in most East European countries. Hungarian cooperative farms, for example, supply their members with seed, feed, young livestock, and transportation and marketing services. Output of private plots is counted in production totals of the farm. The USSR has taken only a small step in this direction. In 1981 a decree was issued that allowed state and collective farms to contract with individuals for raising livestock. The farms provide young animals, feed, and veterinary services, and buy back some of the mature livestock. State and collective farms are allowed to count products obtained under contract in their output totals. 25X1 25X1

In China, one variant of the "responsibility system" divides collective land and other assets among peasants and involves no collective accounting and distribution. Approximately 70 percent of households participate in this system. The household contracts to supply a given quantity of farm products and makes all decisions concerning the production process. The household may sell above-contract production through any marketing channel it chooses and may use land not needed to meet contract obligations as it sees fit. 25X1

used in production. The program reflects the leadership's concern about lagging farm production and represents a renewed political commitment to improving the Soviet diet. A central goal of the program is to reduce dependence on imported farm products.

The Food Program calls for creation of agricultural-industrial coordinating bodies at the all-union, union republic, oblast, and rayon (district) levels. These bodies will bring farms, service organizations, and some other components of the "agro-industrial complex" together under a single administrative hierarchy that is responsible for coordinating the entire food production process from farm to retail outlet.

The all-union body, the national Commission for Questions of the Agro-Industrial Complex, is to "coordinate" the activities of member organizations; "monitor" plan fulfillment for state purchases of agricultural products, deliveries of industrially produced goods, and the production of processed food; and conduct "preliminary examinations" of plans prepared by Gosplan. The power to carry out even these functions is still undefined. Since May 1982, the national commission has held regular meetings but has been able to do little to speed the reorganization or to ensure delivery of promised goods and services to farms.

Councils at the oblast, kray, and autonomous republic level are to monitor plan fulfillment and have the authority to pool resources and redistribute them among members of the agro-industrial complex, as long as union republic ministries and departments agree. These councils can also create interfarm enterprises to produce mixed feed, construction materials, production equipment, and consumer goods. Decentralization of decisionmaking to this level could help eliminate supply bottlenecks, promote more efficient use of resources, and improve coordination in the food production process.

The reorganization carried out at the rayon level is the most significant and controversial aspect of the reorganization. The rayon agro-industrial associations (RAPOs) include as members all farms, agricultural service agencies, and processing enterprises in a given district. As such, they cut across ministerial lines, concentrating authority at the local level.

RAPO authority is constrained to a considerable degree, however, and potential effectiveness is limited. The existing system of central determination of quotas for state purchases of agricultural products and allocation of investment goods and other inputs is not to change. RAPOs can redistribute production targets among farms but can only "confirm" and "examine" plans for service organizations, which are subordinate both to the RAPO and to the parent ministry or state committee. Although RAPOs nominally can redistribute 10 to 15 percent of allocated resources, member organizations must agree. 25X1

25X1

Problems in Implementing the Food Program 25X1

The Andropov regime publicly supported the reorganization but appeared to recognize that, if it were to work, it would require more time and strong leadership support. Even if Andropov's successors can eliminate current delays in implementation, benefits from the reorganization will not appear in time to aid in achieving 1981-85 goals. Full implementation has not yet taken place for two reasons. 25X1

First, the scheme has been resisted by the ministries and state committees that stand to lose authority if a regionally oriented system is fully established. After the May 1982 plenum, one Soviet writer observed that oblast service organizations were advising their rayon subdivisions to participate in RAPOs without giving up traditional prerogatives. As a result, lack of control over service organizations that supply equipment, repair services, agricultural chemicals, and construction services severely limited the effectiveness of the RAPOs. In July 1983 the Andropov regime took additional steps to merge the interests of farms and service organizations by issuing a decree that ties rewards for service organizations to growth in output and productivity on farms they serve. Although Moscow correctly recognizes that farms need a responsive service sector, so far the leadership has been unwilling to eliminate the dual subordination of service organizations. As long as the conflict between RAPOs and the parent ministries continues, management problems will remain. 25X1

25X1

25X1

Second, republic commissions have not been fully established, contributing to the lack of effectiveness of both the national commission and RAPOs. Although republic commissions have been formed, regulations specifying their rights and duties have not yet been published. The delay in drawing up regulations suggests that ironing out differences between central ministries and regional authorities at this level is proving especially difficult.

Revising Incentives on Farms

Improving incentives for farms to carry out agricultural operations on a timely and efficient basis is probably the most important factor in raising product quality and reducing waste in harvesting, transportation, and processing of agricultural products. Improved incentives are also needed to supplement and reinforce the reorganization of agricultural administration and provide more efficient use of new investments. Current plans, however, involve few imaginative, new strategies for improving incentives.

Financial Incentives. The cornerstone of current incentive policy is an increase in money incomes of rural workers and higher profits for farms. The regime will continue to raise farm wages faster than those in other sectors to motivate farmworkers and to make farm jobs more attractive to younger workers who might otherwise migrate to cities.[38] Although the link between profits and the quality of managerial performance is weak, higher profits are intended to increase the funds that farms have available to invest in new production facilities, build housing and cultural facilities, and pay money bonuses to workers.

Although Moscow will continue to reduce the gap between urban and rural incomes, planners apparently recognize that more money income in rural areas will be of little value as an incentive for workers because of the inadequate supply of both consumer goods and producer goods to be used in supporting production on the private plots of farmworkers. Therefore, added incentives are to be provided both for farmworkers and employees of service organizations in the form of wage and in-kind payments in products, primarily grain, sugar, and vegetable oil. We believe that Moscow is reemphasizing payments in kind to encourage livestock raising by private producers. Payments in the form of scarce food products are likely to provide greater incentive than money payments that cannot be spent on the goods and services that the population wants. 25X1 25X1

To boost farm profits, premiums (up to 50 percent of the procurement price) formerly paid only for above-plan deliveries are now to be paid to farms if they increase deliveries to the state over those of average levels during 1976-80. Additional bonuses will be given to managers and specialists if farm product sales and profits exceed the average 1976-80 level. This new policy may increase intervention in farm affairs if farm managers attempt to reap larger bonuses by avoiding production targets levied by planners for relatively unprofitable products. 25X1 25X1

Higher Procurement Prices. The concern of Soviet leaders over the low profitability of farms led to the introduction of higher procurement prices for most products on 1 January 1983. As a result of price increases, the subsidy bill will rise appreciably. The regime plans to spend an additional 16 billion rubles per year for direct price increases and for special price supplements for unprofitable farms.[39] Although prices for all farm products were affected, 70 percent of the 16 billion rubles was to be used to raise procurement prices on livestock products. Sellers of potatoes and vegetables, on the other hand, were to receive only 3.7 percent of the funds for price increases. Despite the large allocation to prices of livestock products, preliminary Soviet data indicate that in 1983 crop production remained more profitable than livestock production, although the gap between the two profit rates narrowed somewhat. Thus, there appears to be no 25X1

[38] We estimate that agricultural incomes per worker—including both money and in-kind payments—rose from 65 percent of nonagricultural incomes in 1960 to 90 percent in 1980. A "quality of life" index that reflected both household incomes and availability of goods and services, however, would show a spread of much more than 10 percent between farm and nonfarm residents.

[39] Speeches by Soviet leaders indicate that the regime presently has no intention of raising retail food prices to cover the procurement price increase. In 1981, subsidies totaling 33 billion rubles were paid to cover the difference between retail prices and production costs of food products. The 11th Five-Year Plan (1981-85) calls for these subsidies to reach 50 billion rubles in 1985. This amount is equivalent to one-half of national income originating in agriculture in 1980. 25X1 25X1

great incentive for farms to switch resources into production of feeds and livestock products, and procurement plans that levy specific quotas for delivery of farm products will continue to be essential to achieve the desired mix of output.[40]

Soviet planners apparently recognize that costs of industrial goods and services will continue to rise in the 1980s and could erode new profit levels in agriculture. According to Soviet writers, to preserve profit levels, future increases in procurement prices will be closely tied to increases in prices of goods and services sold to farms.[41] Although this policy will not encourage efficient use of resources, it recognizes that inflation is substantial and beyond farm control.

Soviet procurement price policy is much less effective than that in Hungary, where procurement prices are used as an indirect influence on the farm decision making process. In Hungary, planners annually establish a list of countrywide procurement prices specifically geared to generating the product mix the regime wants. Input prices are subsidized but geared to encourage rational use.

Although China is trying to use procurement prices in a similar way, the policy is not yet completely successful. A sweeping price reform was undertaken in 1978 to raise rural incomes and to diversify production by raising the profitability of industrial crops. As a result, incentives to produce grain have suffered to the extent that planners are concerned that there may not be enough grain if bad weather hits. In addition, inflation has become a problem in some rural areas as growth in supplies of consumer goods has not matched income growth. Because of the internal political situation, Beijing has been unwilling to make another sweeping price reform but is adjusting prices on a crop-by-crop basis to help control the product mix.

25X1

New Wage Scheme. Problems with shortages of skilled labor, high costs, and inefficiency would lessen if a wage scheme could be implemented that rewards farmworkers according to their contributions to production.[42] The Food Program moves in this direction by calling for the "job contract plus bonus" system of wages to be used throughout agriculture. Under this system, which has been used in some areas since the 1960s, a team of workers contracts with the farm to produce a given quantity of farm products with a specific allocation of machinery and other goods.[43] The farm supplies the equipment, seeds, and chemicals, and agrees to guarantee prompt harvest and storage of the crop. The teams are to be given latitude to manage the production process as they see fit. During the growing season, workers receive monthly cash advances. After the harvest, total wages are increased if crop yields and/or livestock productivity have improved. The sum paid out as monthly advances is deducted from the new wage total, and members of the team share the remainder, which, according to Soviet officials, is expected to account for at least half of total cash payments to workers.

25X1

25X1

25X1

25X1

25X1

According to Soviet writers, this scheme has been successful in linking wages to the "final result." It is an improvement on the piecework or hourly systems of pay that encourage farm machinery operators, for example, to plow, sow, or harvest as many hectares as possible without regard to the quality of work done. The job contract system, used on only 6 percent of Soviet farms, has resulted in higher yields and lower costs. The following problems, however, suggest that it would be difficult to implement the system on a wide scale:

- Many of the teams have disbanded because, in recent years when crops were poor, workers who received piecework or hourly wages earned more than workers belonging to teams with contracts.

[40] Available data on the price increase indicate only how the increase is being allocated among meat, milk, wool, grain, sugar beets, potatoes, vegetables, cotton, and "other" products. Preliminary data for 1983 on the effects of the price increase indicate that the major impact was to raise profitability of livestock production on state farms, narrowing the gap substantially between crops and livestock products. Although collective farms on the average did not lose money on livestock products in 1983, the profit rate evidently was very low and much smaller than that for crop production.

[41] The new pricing scheme involves new policy toward subsidies paid to farms for building materials, certain types of equipment, fuel, and other supplies. Soviet sources indicate that the price increase of 1 January 1983 will allow farms to cover additional costs stemming from the 1982 increase in industrial prices (about 5 billion rubles) out of revenues received from sales of farm products to the state. Subsidies now paid as the result of pre-1982 price increases in the industry apparently will continue.

[42] Under the various wage schemes adopted over the years, the collective or state farmworker perceives little relationship between the quality of work and the pay received.

[43] The size of teams appears to vary widely, ranging from small groups of five to 10 workers to much larger brigades of 20 to 30 members.

25X1

25X1

25X1

25X1

- Teams have not had a reliable supply of agricultural machinery, because farms fail to supply the guaranteed machinery and equipment, choosing to use it for other needs. Teams are dependent on these inputs to meet production targets but have no alternative suppliers and no effective capacity to force farms to honor their part of the contract. We believe that inadequate supplies of machinery, chemicals, and other inputs will be one of the major factors limiting the success of the job contract wage scheme.

- According to the deputy editor of a Soviet agricultural newspaper, contract teams have not been more widely introduced, because many workers lack the necessary training to assume responsibility for all phases of the crop-production cycle and for maintenance and proper use of machinery and equipment.

Incentives in Procurement Organizations. If losses of farm products in transportation and storage and in processing are to be reduced, procurement organizations need better incentives to maintain product quality and to synchronize their operations with those of farms and food-processing enterprises. The Food Program, however, offers no new incentives to procurement workers to maintain product quality. Recent reforms require state procurement organizations to pick up produce at the farm gate and to be responsible for transportation and delivery to the food-processing plant.[44] (Formerly, farms were required to deliver their products to procurement points.) Managers and specialists in procurement organizations will be rewarded if they procure planned quantities of crops and livestock products. The only quality control in the procurement process is to be done by teams of inspectors, who will "monitor" the quality of agricultural raw materials and processed food products. Their efforts probably will have little effect on waste in transportation, storage, and processing. Any improvement will come through the program to provide enhanced storage facilities, better roads, and modern transportation equipment.

[44] In the case of livestock products, only about 20 to 22 percent of procurements are being picked up at the farm gate. The share has risen slowly because of inadequate roads, too few vehicles, freight rates that still do not cover costs, and because RAPOs still have not coped with the fact that vehicles for direct pickup at farms are scattered among three different organizations: *Sel'khoztekhnika,* the Ministry of Meat and Dairy Industry, and the Ministry of Procurement.

Soviet Perceptions of Reform

Because of inherent shortcomings and slow implementation, announced organizational changes probably will make only limited contributions to improvements in food production. As is indicated by one possible scenario for the rest of the decade, average weather over the next few years, close-to-plan deliveries of industrial goods to farms, and price increases for farm products, however, probably will provide enough gains in farm output and productivity, compared with the 1970s, for the regime to consider the Food Program successful. Under these circumstances, there probably would be few modifications to the Food Program. If the weather is poor or if Soviet leaders decide that the cost of likely gains is too high, additional changes in the management of food production might be considered. 25X1

Although the Soviet press in the past several years has debated the advantages of less centralized management, we do not believe that in the 1980s Soviet leaders will move very far toward the Hungarian or Chinese systems. Although little has been written in the Soviet press about China, one writer expressed the opinion that the benefits of improved food supplies had been outweighed by growth of inflation and increased social differentiation within the country. Although Soviet planners have investigated the Hungarian model for possible adaptation in the USSR, they reject this and other East European experiments because they feel that solutions appropriate for the small countries of Eastern Europe are not suitable for a country the size of the USSR.[45] 25X1

More important, however, Soviet leaders have a firm belief in their own system. Movement toward market-oriented systems appears to be unacceptable on ideological grounds. The leadership perhaps considers raising efficiency and lowering costs less important than providing an ideologically acceptable example of management for other centrally planned economies.

[45] Soviet writers have noted that, if farms were to base production decisions on a set of national procurement prices such as those used in Hungary, a pattern of regional specialization in production would develop that would excessively burden the transportation and distribution system. Moscow is committed to regional self-sufficiency in agriculture (trading higher costs of production for lower transportation requirements), rather than regional specialization. 25X1

25X1

Furthermore, Soviet officials for the most part do not share the confidence of Chinese and Hungarian leaders in the ability of local farm managers and private producers to make the "correct" production decisions. Local Soviet party officials continue to interfere in day-to-day farm operations despite the fact that Khrushchev, Brezhnev, Andropov, and current agriculture secretary Mikhail Gorbachev all have condemned this practice, recognizing that it reduces farm efficiency. Even with authority, however, Soviet farm managers would require a more rational price system to improve decisionmaking substantially.

25X1

Table 4 *Percent*
USSR: Average Annual Rates of Growth in Inputs to Agriculture

	1971-75	1976-80	1981-83 Actual	1981-90 Plan [a]
Total	**2.5**	**1.7**	**2.5**	**1.0**
Land	0.8	−0.1	−0.2	0.3
Livestock inventories	1.8	1.3	2.7	0.6
Capital stock	11.1	8.5	8.9	4.7
Purchases from industry	6.9	2.9	4.1	3.3
Labor	−0.2	NEGL	1.2	−0.3

[a] Estimated from Soviet plans for use of land and labor, investment, herd growth, and deliveries of industrial goods.

25X1

Outlook

Average annual growth in net farm output for the balance of the 1980s depends on:

- Growth in use of goods and services on farms.
- The degree to which new programs increase efficiency in the use of resources.
- Weather. Gains in efficiency would be reflected, for example, in accelerated growth in the overall crop yield index and in reduction of feed requirements per unit of livestock output. Good weather would enhance the beneficial effects of Soviet attempts to increase productivity, and poor weather would offset the benefits from these programs.

Goods and Services Used in Farm Production

Present Soviet plans are to hold growth in inputs used in farm production below 1976-80 levels (table 4) and to derive output gains primarily from gains in productivity.

During 1981-83, however, inputs grew at rates well above plan. Although much of the extra growth occurred because anticipated declines in farm labor did not materialize, deliveries of industrial goods were also above plan.[46] Despite official statements, planners appear to realize that—at least for the present—output gains will require above-plan growth in inputs and that productivity gains are not likely to reach plan levels. We expect two major factors to influence growth in inputs for the balance of the decade.

25X1

First, maintenance of above-plan growth in investments and other industrial goods used by farms would require that the regime give very high, continuing priority to the Food Program. The slow pace of industrial growth that we project for the 1980s suggests that adjustments in other programs might have to be made if the Food Program is to be supported to this extent.

25X1

25X1

Second, agriculture will continue to face manpower shortages in many regions. Past policies to lure young people to industrial centers, together with neglect of rural regions, has left agriculture with an older, relatively unskilled labor force. Although there was a net increase in the total number of agricultural workers in 1982 and 1983, workers adequately trained to cope with modern farming techniques and equipment are still in especially short supply. The speed with which major improvements in rural living conditions are provided will determine whether labor turnover remains high, and retention of newly trained skilled workers continues to be difficult.

25X1

[46] The number of workers employed in agricultural work on state and collective farms declined steadily from 1965 to 1981. In 1982 and 1983 employment increased slightly. Since 1970, furthermore, the number of hours worked per employee has increased as has the number of seasonally employed nonagricultural workers. In addition, hours worked on private plots have increased because of the growth in private livestock inventories since 1976.

25X1

Increased Efficiency in the Use of Resources

Growth in the combined productivity of land, other productive assets, and labor will depend on the effectiveness of changes in agricultural management policies and in their implementation. Although there are several policies that will have a positive impact on productivity, their benefits may be reduced by poor weather or by the effects of organizational and management policies that tend to inhibit the growth of efficiency.

Positive Influences. There are indications of several long-term shifts in agricultural policies that could improve growth in the overall crop-yield index and increase efficiency of livestock production.

First, livestock feed rations are likely to improve to some extent, although they will not reach optimal levels by 1990.[47] Increased supplies of grain, forage crops, and industrially produced feed ingredients, together with higher pasture yields, will raise the quantity of feed per animal and improve nutritional balance, especially if the regime adopts a policy of slow herd growth.[48] Growth in roughage production will be more crucial for growth in the livestock sector than grain production throughout the balance of the decade. Assuming current feeding practices, our calculations indicate that the need for roughages will grow by nearly 3 percent per year during the remainder of the decade if meat output grows at the 1960-83 trend rate. The need for grain will grow by slightly over 2 percent annually. If the regime continues to raise the priority of forages in terms of machinery support, seed production, fertilizer and labor use, and storage and handling capacity, farms could sustain growth rates in forage production higher than those at present.[49] 25X1

Second, the increase in use of summer fallow that has occurred since 1975 should help stabilize grain yields and increase their quantity and quality.[50] 25X1

Third, Soviet seed breeders have introduced several new varieties of wheat and rye that could contribute to grain quantity and quality. More efforts are also being made to supply farms with crop seeds that are adapted to the areas of the country in which they will be grown. 25X1 25X1

Fourth, in addition to improving livestock feeding practices, the USSR has indicated interest in procuring North American–type cattle to improve the genetic potential of the dairy herd. 25X1 25X1

Finally, imports from the West of technology for machinery production, pesticides, and so forth, would have a positive effect on efficiency. 25X1

Negative Influences. Two factors will make it difficult for Soviet agriculture to realize the benefits from agrotechnical improvements. 25X1

First, we believe that new organizational measures and incentives—though a step in the right direction—are being implemented too slowly. They probably will have only a limited impact in the 1980s on the willingness and ability of farms to carry out more

[47] Current livestock rations amount to 2.6 to 2.7 tons of feed units per year for each standard animal unit. (Total standard animal units are derived by weighting inventories of cattle, hogs, poultry, sheep, and goats, according to feed requirements for each type of animal.) Soviet writers claim that available feed units should amount to 3.5 to 4.5 tons annually per standard animal unit.

[48] Historically, Soviet farms have been encouraged to increase herd numbers, even at the cost of declining animal productivity when feed supplies were short. Recently, there have been indications that this emphasis is shifting. Farms are being criticized for keeping nonproductive animals merely to be counted in the 1 January census.

[49] If farms do not produce sufficient roughage, they probably will continue to cover deficits by feeding extra grain, despite the campaign to reduce this practice. Because of low levels of mechanization, insufficient fertilizer, and high labor requirements, feed units derived from forage crops are more expensive than feed units derived from grain, which has enjoyed much higher priority in resource allocation. The share of grain in total feed use has increased from an average of 25 percent during 1965-75 to 29 percent in 1982. In some areas such as Estonia, the share is as high as 60 percent. Roughage shortfalls can be covered with grain, to a limited extent. Overfeeding of grain, particularly to cattle, disrupts digestion and causes problems, including sterility and various diseases. 25X1 25X1

[50] Under the practice of clean fallowing, the land is not planted and is cultivated only as needed to prevent weeds from growing. This practice also permits accumulation of moisture and nitrogen in the soil. 25X1 25X1

timely seeding, cultivating, fertilizer application, pest control, and harvesting. The problem of synchronizing activities of farms, food-processing enterprises, transportation organizations, and so forth, is likely to remain for the balance of the decade because central ministries almost certainly will continue to resist the transfer of control of food production to regional bodies.

Second, it will be difficult to reduce costs and increase efficiency as long as the leadership is unwilling to:

- Eliminate centrally determined quotas for output of farm products and goods and services used in production.
- Stop interference by party officials and bureaucrats in day-to-day farm operations.
- Sufficiently overhaul the inappropriate price structure both for goods and services sold to farms and for farm products.
- Replace gross farm production as the most important determinant of success.

Projections of Growth in Net Farm Output for the 1980s

Because the development of the Soviet farm sector in the 1980s will depend strongly on weather and how the leadership implements the Food Program, single-value forecasts of average annual growth in net farm output are inadequate to analyze the potential effects of the relevant variables. Therefore, we present three scenarios for growth in net farm output in the 1980s. Each scenario incorporates different assumptions about weather, leadership attitudes toward supplying agriculture with inputs, and degree of success of programs to increase efficiency.

Baseline Case. Our baseline projection assumes that:

- Weather approximates the 1960-83 average for the balance of the decade.[51] Weather would thus be better than that experienced, on average, after 1978, but not as good as that experienced from the mid-1960s to the mid-1970s.

- With better weather, planners become more optimistic about programs to increase productivity and reduce the current rate of growth of inputs from 2.5 percent to 1.5 to 2 percent, at or slightly below the long-term average annual growth rate for 1961-75.

- Policy measures to increase productivity are partially successful. Productivity does not decline as it did in the 1970s, but grows at 0.5 percent per year, slightly below average annual growth during 1961-75. Under these circumstances, net farm output during the 1980s would grow at an average annual rate of 2 to 2.5 percent. This is approxmimately the same rate of growth that would occur if output of major farm products grew at the 1960-83 trend rate for the balance of the 1980s. 25X1 25X1

Worst Case. At worst, farm output growth would not improve over the poor performance of 1976-80 and would increase at 0 to 0.5 percent per year. This assumes:

- No improvement from the less favorable growing and harvesting weather experienced on average after 1978.

- Efforts to improve feed rations, seed varieties, and so forth, fall short. Crop yields stagnate and no improvement occurs in feeding efficiency. Lack of incentives and bureaucratic inertia keep costs high and productivity low. 25X1

- Planners' attempts to maintain growth in inputs at present levels (2.5 percent per year) to compensate for much less favorable weather are not successful, and growth in inputs remains at average annual levels of 1976-80. Under these circumstances, net farm output would grow at 0 to 0.5 percent, inputs would grow at 1.7 percent, and productivity would decline at 1.2 to 1.7 percent per year. 25X1 25X1

Optimistic Case. This projection assumes that:

- Weather is better than average.

- Substantial progress is made in livestock feeding efficiency and in improving cropping practices. Crop yields grow at an accelerated pace and output per unit of feed inputs increases at a sustained rate. Efforts to improve organization and management, enhanced by good weather, provide growth in productivity of 1.5 to 2 percent.

[51] We assume that weather for 1960-83 was, on average, close to the long-range norm. 25X1

- Soviet leaders perceive less need to supply inputs at above-plan rates and cut back growth to the plan rate of 1 percent, releasing resources for other programs. Under these circumstances, net farm output would grow at 2.5 to 3.0 percent per year—about the same annual rate as in 1966-70, when productivity gains accounted for a high share of total growth.

Impact on Per Capita Consumption

If production increases at rates set forth in our baseline case, growth in net farm output in the 1980s will be higher than in the 1970s and will provide some gains in per capita consumption of quality foods. Because consumer incomes are slated to rise at about the same rate as our baseline case predictions for net farm output, demand for quality foods (livestock products, fruits, and vegetables) would keep pace with growth in supplies.[52] Many of the regime's 1990 goals for per capita consumption, however, will be out of reach. The following tabulation shows the degree to which our baseline projection of growth in net farm output in the 1980s would meet 1990 targets for per capita consumption: [53]

	No shortfall	Shortfall of 15 percent or less	Shortfall greater than 15 percent
Potatoes	X		
Fruit		X	
Vegetables			X
Meat			X
Milk	X		
Eggs	X		
Sugar		X	
Vegetable oil			X

[52] This calculation assumes that income elasticity of demand for these products is equal to 1. In this case, consumers would increase demand for these products in the same proportion to the increase in income. If income elasticity is greater than 1, increases in demand would be greater than those of income.

[53] Soviet 1990 per capita consumption goals for meat are approximately equal to 60 percent of US per capita consumption in 1982. Per capita consumption goals for other products as a share of US per capita consumption in 1982 are sugar—75 percent; eggs, fruit and vegetables—100 percent; milk—130 percent; and potatoes—300 percent.

These calculations assume that output of major farm products grows at the 1960-83 trend rate for the balance of the decade, waste factors remain unchanged, and there is no net trade other than sugar imports from Cuba. 25X1

The per capita consumption gains for most products provided by this growth in farm output probably would be considered adequate by the regime, especially if Chernenko continues the consumer policies of Andropov. The meat shortfall is likely to be smaller than that shown above because the USSR probably will continue to import grain to boost livestock production. Grain imports, however, are not likely to reach levels necessary to meet plan goals for meat production.[54] 25X1 25X1

Soviet policy toward food imports for the remainder of the decade will depend on which production scenario farm output follows and leadership attitudes toward food imports from the West. Under baseline or optimistic case conditions, imports of grain and other food products are likely to be below the record levels of recent years. If farm output follows our worst case projections, the regime is likely to maintain levels of imports high enough to keep per capita consumption of quality foods from declining. 25X1

In May 1982, in his Food Program speech, Brezhnev noted the "need to reduce imports of foodstuffs from capitalist countries." Soviet leaders apparently believe that minimizing dependence on imports from the West is more important than rapid growth in per capita food consumption. As long as the regime maintains this belief, large imports of grain and other food products from the West probably will not occur. 25X1

[54] Our calculations show that, under these assumptions, the USSR would have to supplement grain harvests with 30 million tons of imports per year to meet plan targets for meat production in 1990. 25X1 25X1

25X1